



中国认可
国际互认
检测
TESTING
CNAS L0446

GRGTEST®

Page 1 of 37

Test Report

Verified code: 454058

Report No.: E20240410840201-3

Customer: Lumi United Technology Co., Ltd

Address: Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue,
Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

Sample Name: Smart Lock U50

Sample Model: DL-D05D

Receive Sample Date: Apr.11,2024

Test Date: Apr.22,2024 ~ Apr.28,2024

Reference AS/NZS 4268:2017
Document: ETSI EN 300 330 V2.1.1 (2017-02)

Test Result: Pass

Prepared by: Huang Lifang
Huang Lifang

Reviewed by: Wu Haoting
Wu Haoting

Approved by: Xiao Liang
Xiao Liang

GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2024-05-10

GRG METROLOGY & TEST GROUP CO., LTD.

Address: No.163, Pingyun Road, West of Huangpu Avenue, Guangzhou, Guangdong, China
Tel: (+86) 400-602-0999 FAX: (+86) 020-38698685 Web: <http://www.grgtest.com>



Statement

1. The report is invalid without "special seal for inspection and testing"; some copies are invalid; The report is invalid if it is altered or missing; The report is invalid without the signature of the person who prepared, reviewed and approved it.
2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.
3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.
4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.
5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

----- The following blanks -----

REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20240410840201-3	Original Issue	2024-04-29

----- The following blanks -----

TABLE OF CONTENTS

1	TEST RESULT SUMMARY	6
2	GENERAL DESCRIPTION OF EUT.....	7
2.1	APPLICANT	7
2.2	MANUFACTURER	7
2.3	BASIC DESCRIPTION OF EQUIPMENT UNDER TEST	7
2.4	TEST OPERATION MODES	8
2.5	BLOCK DIAGRAM	8
2.6	LOCAL SUPPORTIVE INSTRUMENTS.....	8
3	LABORATORY AND ACCREDITATIONS	9
3.1	LABORATORY	9
3.2	ACCREDITATIONS	9
3.3	MEASUREMENT UNCERTAINTY	9
3.4	LIST OF USED TEST EQUIPMENT	10
4	H-FIELD MEASUREMENTS AND LIMITS AND LIMITS AT 3m.....	11
5	TRANSMITTER REQUIREMENTS	12
5.1	OPERATING FREQUENCY RANGES.....	12
5.1.1	LIMIT	12
5.1.2	TEST SETUP	12
5.1.3	SPECTRUM ANALYZER SETTING	12
5.1.4	TEST PROCEDURE.....	13
5.1.5	TEST RESULT	14
5.2	EMISSION BANDWIDTH.....	16
5.2.1	LIMIT	16
5.2.2	TEST SETUP	16
5.2.3	SPECTRUM ANALYZER SETTING	16
5.2.4	TEST PROCEDURE.....	17
5.2.5	TEST RESULT	17
5.3	MAXIMUM EIRP	19
5.3.1	LIMIT	19
5.3.2	TEST SETUP	19
5.3.3	SPECTRUM ANALYZER SETTING	20
5.3.4	TEST PROCEDURE.....	20
5.3.5	TEST RESULT	21
5.4	TRANSMITTER RADIATED SPURIOUS DOMAINEMISSION LIMITS < 30 MHZ	27
5.4.1	LIMIT	27
5.4.2	TEST SETUP	27
5.4.3	SPECTRUM ANALYZER SETTING	27
5.4.4	TEST PROCEDURE.....	28
5.4.5	DATASAMPLE	28
5.4.6	TEST RESULT	29
5.5	TRANSMITTER RADIATED SPURIOUS DOMAINEMISSION LIMITS > 30 MHZ	31

5.5.1 LIMIT..... 31

5.5.2 TEST SETUP 31

5.5.3 SPECTRUM ANALYZER SETTING..... 31

5.5.4 TEST PROCEDURE..... 32

5.5.5 DATA SAMPLE 32

5.5.6 TEST RESULT 33

APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM 37

APPENDIX B. PHOTOGRAPHS OF EUT..... 37

----- The following blanks -----

1 TEST RESULT SUMMARY

Transmitter Part				
Item	Test Requirement	Test Method	Application Condition	Result
Operating frequency ranges	AS/NZS 4268:2017 Clause 6.6	ETSI EN 300 330 V2.1.1 Clause 6.2.2	Applies to all EUT	Complied
Emission bandwidth	AS/NZS 4268:2017 Clause 6.5	ETSI EN 300 330 V2.1.1 Clause 6.2.3	Applies to all EUT	Complied
Maximum EIRP	AS/NZS 4268:2017 Clause 6.3	ETSI EN 300 330 V2.1.1 Clause 6.2.4	Only for equipment under class 1 and class 2	Complied
Transmitter radiated spurious domain emission limits < 30 MHz	AS/NZS 4268:2017 Clause 6.4	ETSI EN 300 330 V2.1.1 Clause 6.2.8	Applies to all EUT	Complied
Transmitter radiated spurious domain emission limits > 30 MHz	AS/NZS 4268:2017 Clause 6.4	ETSI EN 300 330 V2.1.1 Clause 6.2.9	For equipment under class 1,2 and 4 in clause 6.1.2	Complied

Receiver Part				
Item	Test Requirement	Test Method	Application Condition	Result
Receiver spurious emissions	AS/NZS 4268:2017 Clause 7.2	EN 300 330 V2.1.1 Clause 6.3.1	Does only apply to receivers which are not co-located with transmitters	N/A See Note 1

Note 1: N/A=Not Applicable, these requirements only for Receiver. this prototype only supports transmitting.

2 GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name: Lumi United Technology Co., Ltd
Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.2 MANUFACTURER

Name: Lumi United Technology Co., Ltd
Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Product Name: Smart Lock U50
Product Model: DL-D05D
Adding Model: DL-D05E
Models Difference: They have the same technical construction including circuit diagram PCB layout, hardware version and software version identical, except the model name.
Trade Name: Aqara
Power Supply: DC 6V power supplied by 4 AA batteries with the rear lock, DC 5V supplied by USB-C emergency port with the front lock.
Frequency Band: 13.56MHz
Max. H-field: -16.67dBμA/m@10m
Max.EIRP: 1.0188E-05 mW
Antenna Type: PCB Antenna
Modulation type: ASK
Sample submitting way: ☒ Provided by customer ☐ Sampling
Sample No: E20240311968201-0001, E20240311968201-0004
Hardware version: V3.1
Software version: 1.0.4_0007

Note: 1. The basic description of the EUT is provided by the applicant. This report is made Solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions.
2. The bluetooth and zigbee RF chip in the rear lock, and the NFC chip in the front lock.

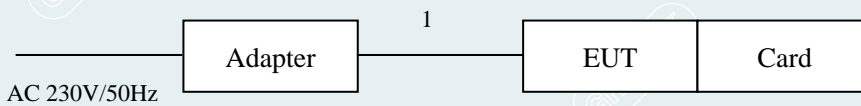
2.4 TEST OPERATION MODES

Mode No.	Description of the modes
Mode 1	Continuous TX
Mode 2	Intermittent TX

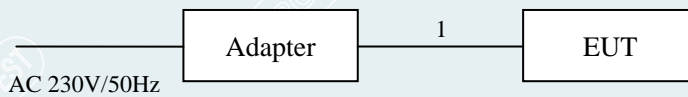
NOTE: 1.Mode 1 is the EUT inducted with card;Mode 2 is the EUT has independent emission.

2.5 BLOCK DIAGRAM

For Mode 1



For Mode 2



2.6 LOCAL SUPPORTIVE INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number	Note
Adapter	/	/	/	/
Card	/	/	/	/

No.	Cable Type	Qty.	Shielded Type	Ferrite Core(Qty.)	Length
1	USB cable	1	No	0	1.0m

3 LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

Add : No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District
Shenzhen, 518110, People's Republic of China

P.C. : 518110

Tel : 0755-61180008

Fax : 0755-61180008

3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

China CNAS(L0446)

Copies of granted accreditation certificates are available for downloading from our web site,
<http://www.grgtest.com>

3.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT

Measurement	Uncertainty
RF frequency	6.0×10^{-6}
Humidity	6.0 %
Temperature	2.0°C

Measurement		Frequency	Uncertainty
Radiated Emission	X	9kHz~30MHz	4.4dB
	Y	9kHz~30MHz	4.4dB
	Z	9kHz~30MHz	4.4dB
	Horizontal	30MHz~200MHz	4.6dB
	Vertical	30MHz~200MHz	4.7dB
	Horizontal	200MHz~1000MHz	4.8dB
	Vertical	200MHz~1000MHz	4.7dB

This uncertainty represents an expanded uncertainty factor of $k=2$.

This uncertainty represents an expanded uncertainty expressed at approximately the 95%.

3.4 LIST OF USED TEST EQUIPMENT

Name of equipment	Manufacturer	Model	Serial number	Calibration due
Operating frequency ranges & Emission bandwidth & Maximum EIRP & Transmitter radiated spurious domain emission limits < 30 MHz & Transmitter radiated spurious domain emission limits > 30 MHz				
Test Receiver	R&S	ESR26	101758	2024-09-22
Loop Antenna	schwarzbeck	FMZB 1513-60	1513-60-56	2024-07-15
Bi-log Antenna	Schwarzbeck	VULB 9160	VULB9160-3401	2024-12-04
Preamplifier	SHIRONG ELECTRONIC	DLNA-30M1G-G41	20200928002	2024-10-24
Test Software	Tonscend	JS32-RE/2.5.1.5		
Test Software	Tonscend	JS36-RSE/5.0.0.1		

Note: The calibration interval of the test instruments is 12 months.

----- The following blanks -----

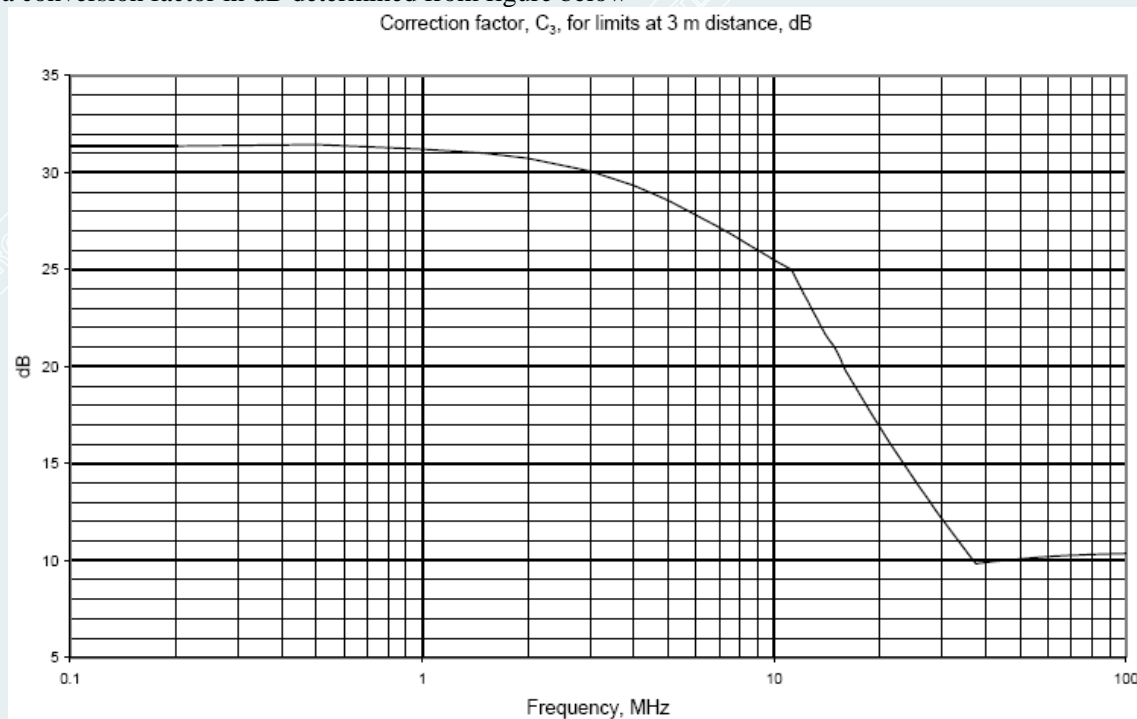
4 H-FIELD MEASUREMENTS AND LIMITS AND LIMITS AT 3m

The H-field limit in dB μ A/m at 3 m, H_{3m} , is determined by the following equation:

$$H_{3m} = H_{10m} + C_3$$

H_{10m} is the H-field limit in dB μ A/m at 10 m distance

C_3 is a conversion factor in dB determined from figure below



For measuring equipment calibrated in dB μ V/m, the reading should be reduced by 51,5 dB to be converted to dB μ A/m.

----- The following blanks -----

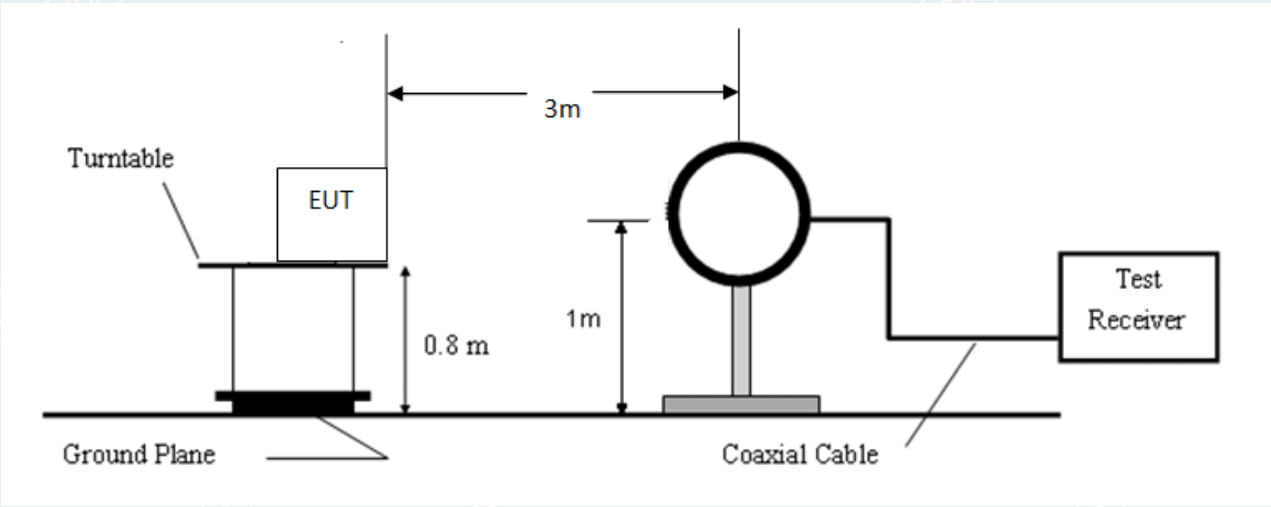
5 TRANSMITTER REQUIREMENTS

5.1 OPERATING FREQUENCY RANGES

5.1.1 LIMIT

Class of transmitter	Permitted operating frequency band(MHz) (lower limit exclusive, upper limit inclusive)
All transmitters	13.553 MHz to 13.567 MHz

5.1.2 TEST SETUP



5.1.3 SPECTRUM ANALYZER SETTING

Spectrum Parameters	Setting
RBW	9kHz
VBW	10kHz
Start frequency	Lower than the lower edge of the permitted frequency range
Stop frequency	Higher than the upper edge of the permitted frequency range
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

5.1.4 TEST PROCEDURE

- a. EUT was placed on a turn table, which is 0.8 meter high above ground.
- b. Set the EUT transmit continuously with maximum output power.
- c. Loop Antenna is set 3 meters away from the EUT, Which is connect to a measurement receiver.
- d. Spectrum analyzer setting parameters in accordance with section 5.1.3.
- e. The turn table can rotate 360 degrees to determine the position of the maximum emission level.
- f. Allow trace to stabilize, use the 99% power bandwidth function to determine the operating frequency range:
 - f_H is determined. f_H is the frequency of the upper marker resulting from the OFR.
 - f_L is determined. f_L is the frequency of the lower marker resulting from the OFR.
 - f_c is the centre frequency, $f_c = (f_L + f_H)/2$.
- g. Record the worst case result in the test report.

----- The following blanks -----

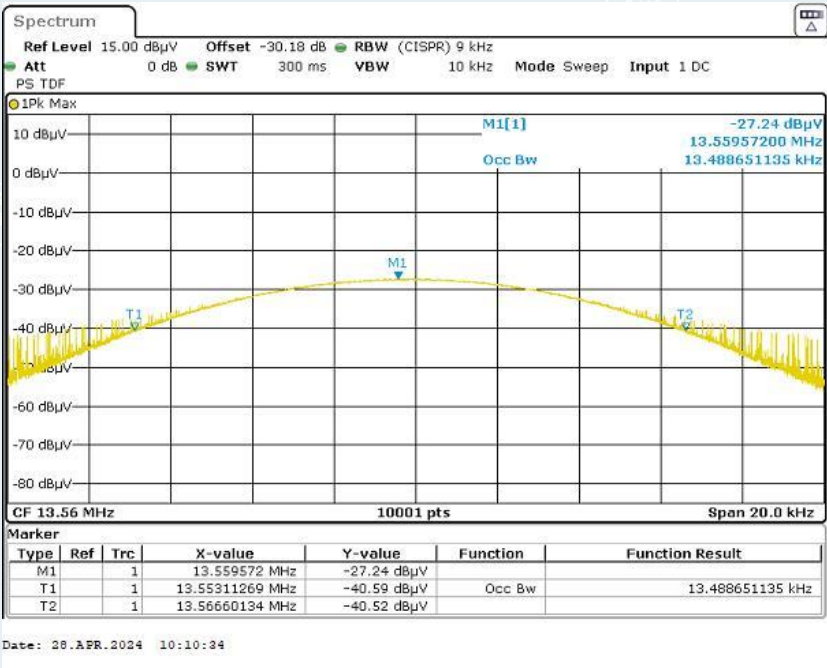
5.1.5 TEST RESULT

Date of testing:	2024-04-28
Ambient temperature:	23.5 °C
Relative humidity:	52%RH
Ambient Pressure	101kPa

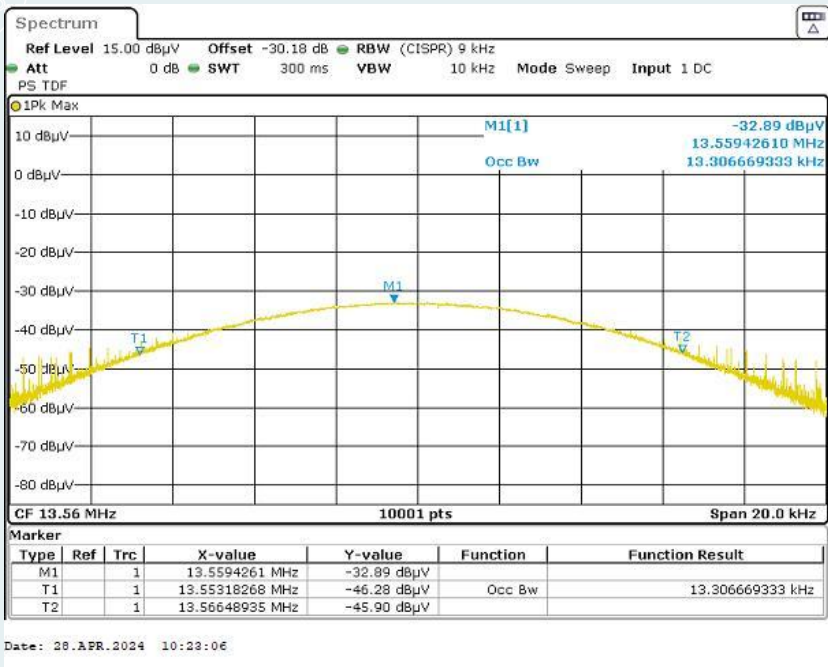
Note: This report records the worst polarity X results of the loop antenna.

Test mode	f _L Test Result (MHz)	f _H Test Result (MHz)	fc Test Result (MHz)	Limit (MHz)		Result
				Lower	Higher	
Mode 1	13.5531	13.5666	13.5596	f _L ≥13.553	f _H ≤13.567	Complied
Mode 2	13.5532	13.5665	13.5594	f _L ≥13.553	f _H ≤13.567	Complied

Mode 1



Mode 2



----- The following blanks -----

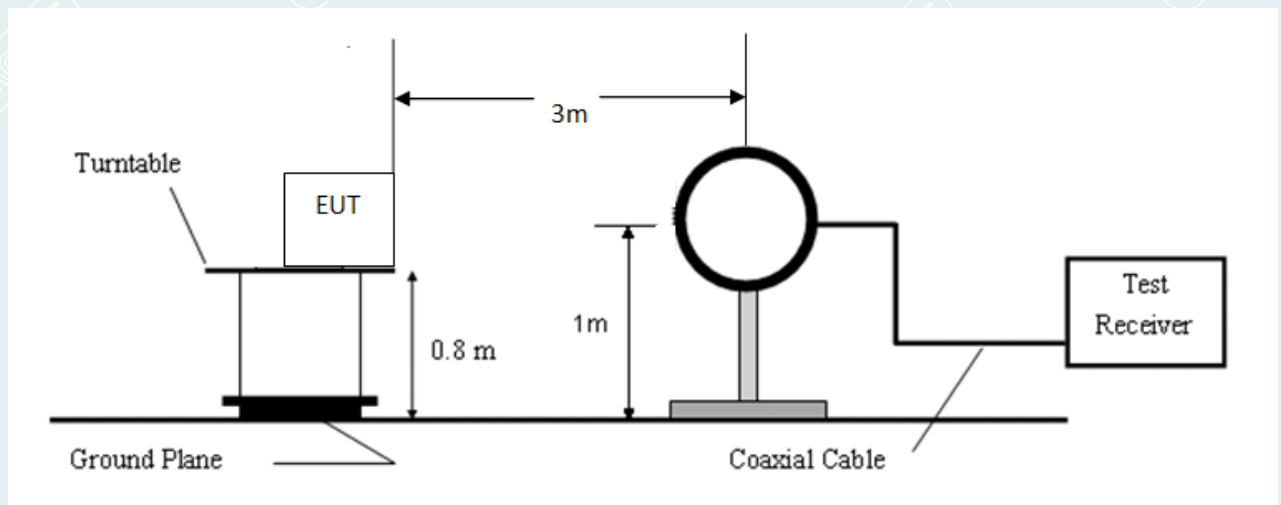
5.2 EMISSION BANDWIDTH

5.2.1 LIMIT

The upper and lower frequency limits of the transmitter 99% emission power bandwidth shall at all times remain within the operating frequency limits.

Some transmitter categories require a specific limit for emission bandwidth. In such cases, the emission bandwidth shall be established by testing in accordance with the relevant specified Standard.

5.2.2 TEST SETUP



5.2.3 SPECTRUM ANALYZER SETTING

Spectrum Parameters	Setting
RBW	9kHz
VBW	10kHz
Start frequency	Lower than the lower edge of the permitted frequency range
Stop frequency	Higher than the upper edge of the permitted frequency range
Sweep Time	Auto
Detector	Peak
Trace Mode	Max Hold

5.2.4 TEST PROCEDURE

- EUT was placed on a turn table, which is 0.8 meter high above ground.
- Set the EUT transmit continuously with maximum output power.
- Loop Antenna is set 3 meters away from the EUT, which is connect to a measurement receiver.
- Spectrum analyzer setting parameters in accordance with section 5.2.3.
- The turn table can rotate 360 degrees to determine the position of the maximum emission level.
- The X, Y and Z polarization of the antenna are set on test.
- Record the results in the test report.

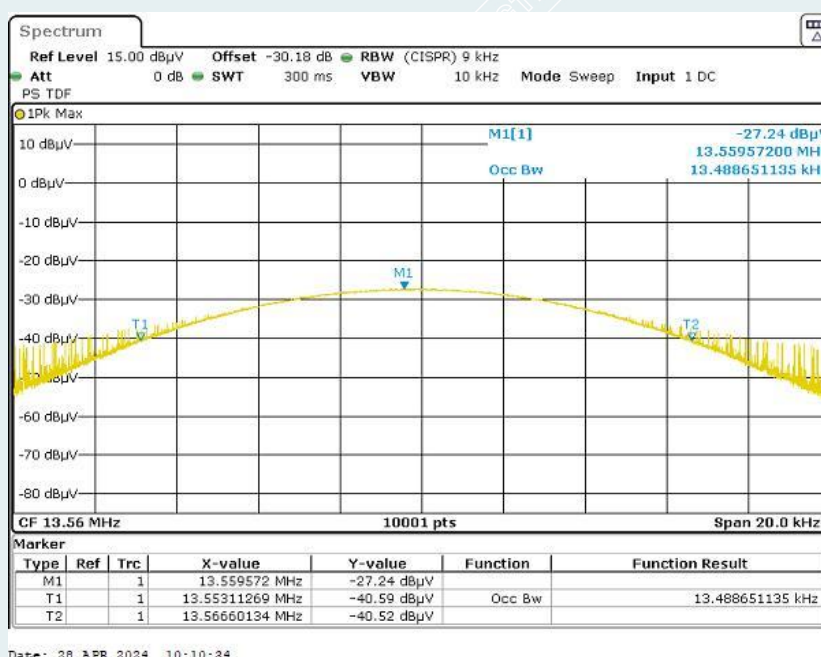
5.2.5 TEST RESULT

Date of testing:	2024-04-28
Ambient temperature:	23.5 °C
Relative humidity:	52%RH
Ambient Pressure	101kPa

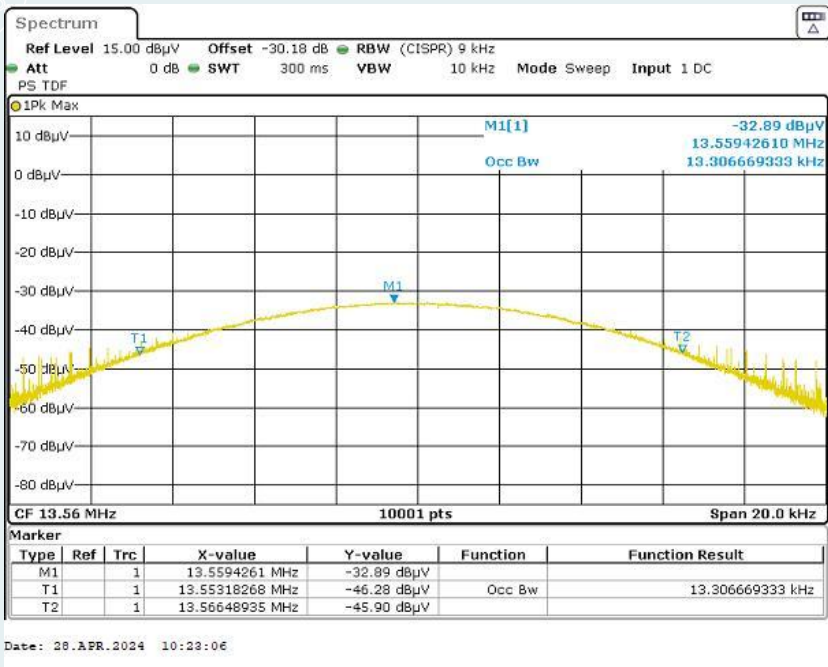
Note: This report records the worst polarity X results of the loop antenna.

Test mode	f_L Test Result (MHz)	f_H Test Result (MHz)	Emission bandwidth (kHz)	Limit (MHz)		Result
				Lower	Higher	
Mode 1	13.5531	13.5666	13.489	$f_L \geq 13.553$	$f_H \leq 13.567$	Complied
Mode 2	13.5532	13.5665	13.307	$f_L \geq 13.553$	$f_H \leq 13.567$	Complied

Mode 1



Mode 2



----- The following blanks -----

5.3 MAXIMUM EIRP

5.3.1 LIMIT

Class of transmitter	Permitted operating frequency band(MHz) (lower limit exclusive, upper limit inclusive)	Maximum EIRP	Note
ALL transmitters	13.553 MHz to 13.567 MHz	100 mW	P_{lim}
ALL transmitters	13.553 MHz to 13.567 MHz	53.24 dB μ A/m(@10m)	H_{lim}

In the frequency range 9kHz to 30MHz, measurement of magnetic field strength is required. The result will not be considered to demonstrate compliance unless the measurement distance is reported with the result. The limit is converted from EIRP in watts to magnetic field strength in dB (μ A/m) using the following formula:

$$H_{lim} = 20 \times \log_{10} \left(\frac{\sqrt{P_{lim} / 30}}{4\pi d} \right) + 120$$

where

H_{lim} = magnetic field strength limit, in dB (μ A/m)

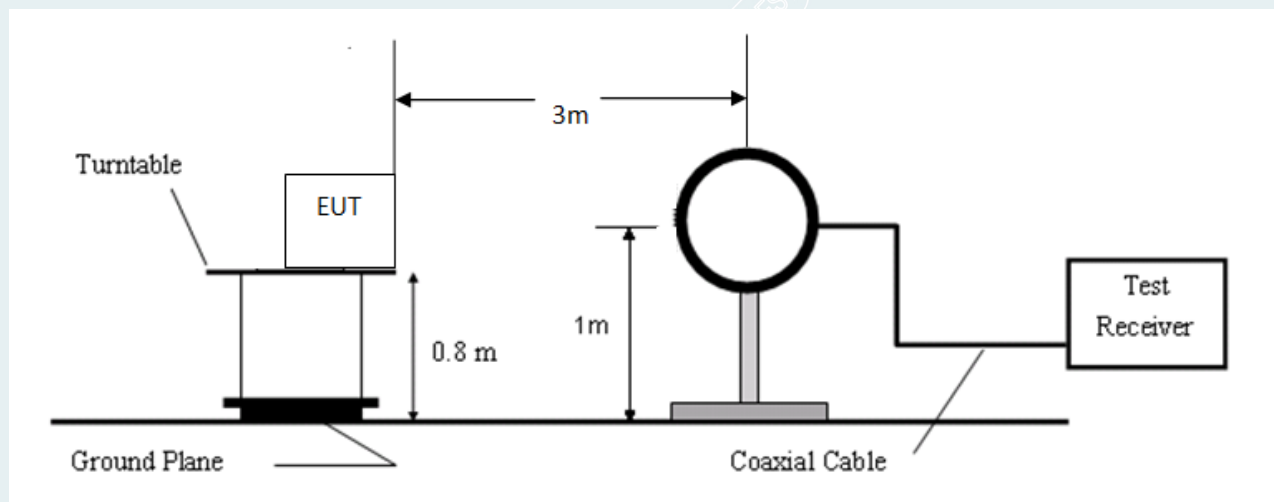
P_{lim} = EIRP limit, in watts

d = measurement distance, in metres

NOTES:

1. Where a limit changes amplitude over a band of frequencies, logarithmic interpolation of frequency (i.e. a straight line on a graph with a logarithmic frequency axis) should be used.
2. In the frequency range 9 kHz to 30 MHz, it is highly unlikely that the measurement can be made in the far field.

5.3.2 TEST SETUP



5.3.3 SPECTRUM ANALYZER SETTING

Spectrum Parameters	Setting
RBW	9kHz
VBW	10kHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

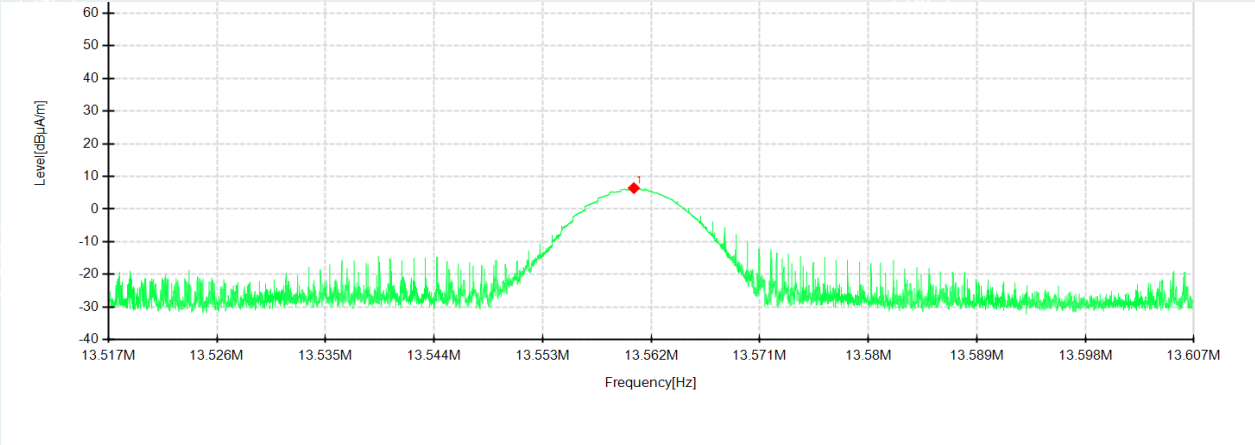
5.3.4 TEST PROCEDURE

- EUT was placed on a turn table, which is 0.8 meter high above ground.
- Set the EUT transmit continuously with maximum output power.
- Loop Antenna is set 3 meters away from the EUT, which is connect to a measurement receiver.
- Spectrum analyzer setting parameters in accordance with section 5.3.3.
- The turn table can rotate 360 degrees to determine the position of the maximum emission level.
- The X, Y and Z polarization of the antenna are set on test.
- Record the results in the test report.

----- The following blanks -----

5.3.5 TEST RESULT

Project Information			
Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0004
Mode:	Mode 1	Voltage:	AC 230V/50Hz
Environment:	25.0℃/60%RH/101.0kPa	Engineer:	Chen Xiacong
Test date:	2024-04-22	Remark:	X



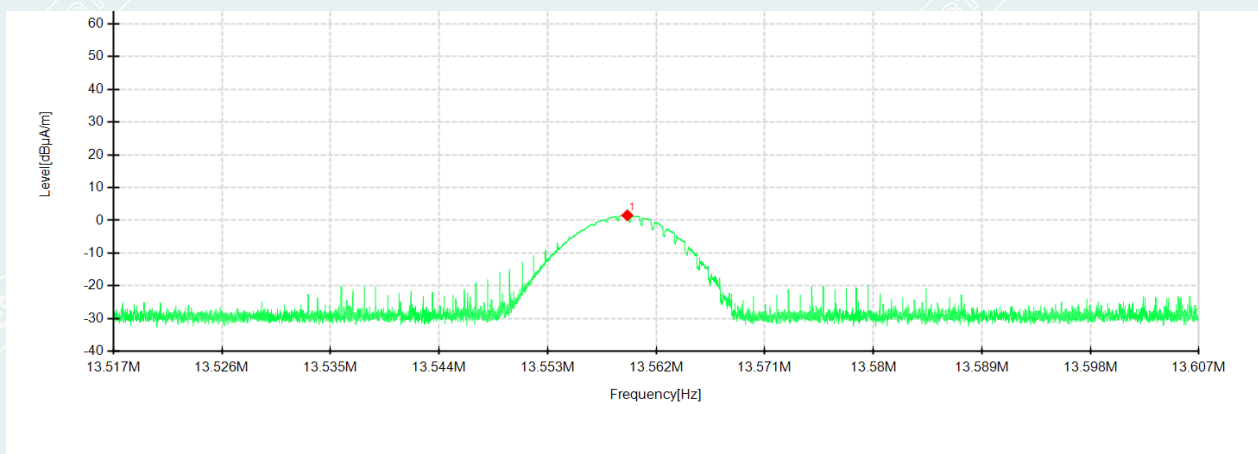
Suspected Data List									
NO.	Freq. [MHz]	Level at 3m [dBμA/m]	Factor [dB]	Level at 10m [dBμA/m]	Margin [dB]	Limit at 10m [dBμA/m]	Height [cm]	Angle [°]	Polarity
1	13.5606	6.43	-30.68	-16.67	69.91	53.24	100	156	X

Note:

- a. H-field Level at 10m = H-field Level at 3m -23.1 dB = 6.43 dBμA/m – 23.1 dB = -16.67 dBμA/m;
- b. Maximum EIRP: $P_{(10m)} = 30 \times (4 \times \pi \times d \times 10^{((H-120)/20)})^2 = 30 \times (4 \times 3.14 \times 10 \times 10^{((-16.67-120)/20)})^2 = 1.0188E-08 \text{ W} = 1.0188E-05 \text{ mW}.$

Project Information

Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0004
Mode:	Mode 1	Voltage:	AC 230V/50Hz
Environment:	25.0°C/60%RH/101.0kPa	Engineer:	Chen Xiacong
Test date:	2024-04-22	Remark:	Y



Suspected Data List

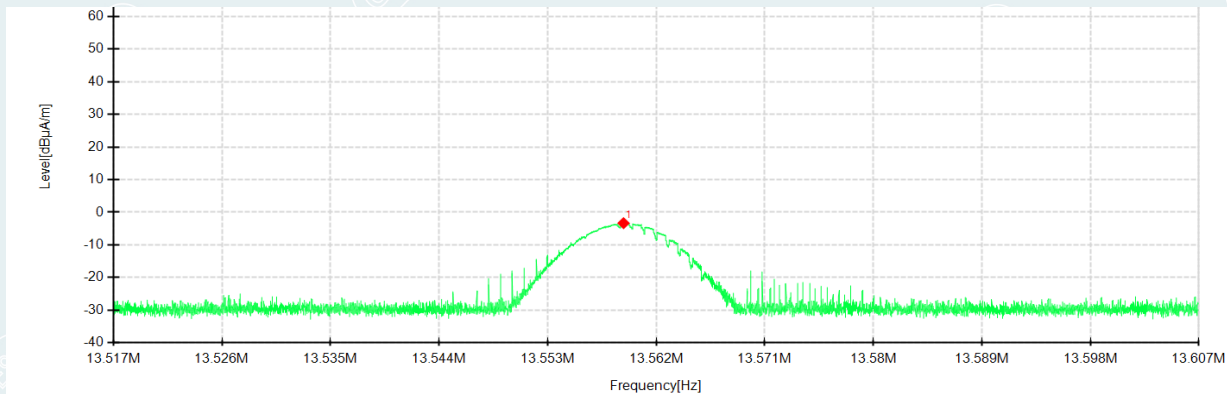
NO.	Freq. [MHz]	Level at 3m [dBμA/m]	Factor [dB]	Level at 10m [dBμA/m]	Margin [dB]	Limit at 10m [dBμA/m]	Height [cm]	Angle [°]	Polarity
1	13.5596	1.54	-30.68	-21.56	74.80	53.24	100	276	Y

Note:

- H-field Level at 10m = H-field Level at 3m - 23.1 dB = 1.54 dBμA/m - 23.1 dB = -21.56 dBμA/m;
- Maximum EIRP: $P_{(10m)} = 30 * (4 * \pi * d * 10^{((H-120)/20)})^2 = 30 * (4 * 3.14 * 10 * 10^{((-21.56-120)/20)})^2 = 3.3045E-09 \text{ W} = 3.3045E-06 \text{ mW}$.

Project Information

Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0004
Mode:	Mode 1	Voltage:	AC 230V/50Hz
Environment:	25.0°C/60%RH/101.0kPa	Engineer:	Chen Xiacong
Test date:	2024-04-22	Remark:	Z



Suspected Data List

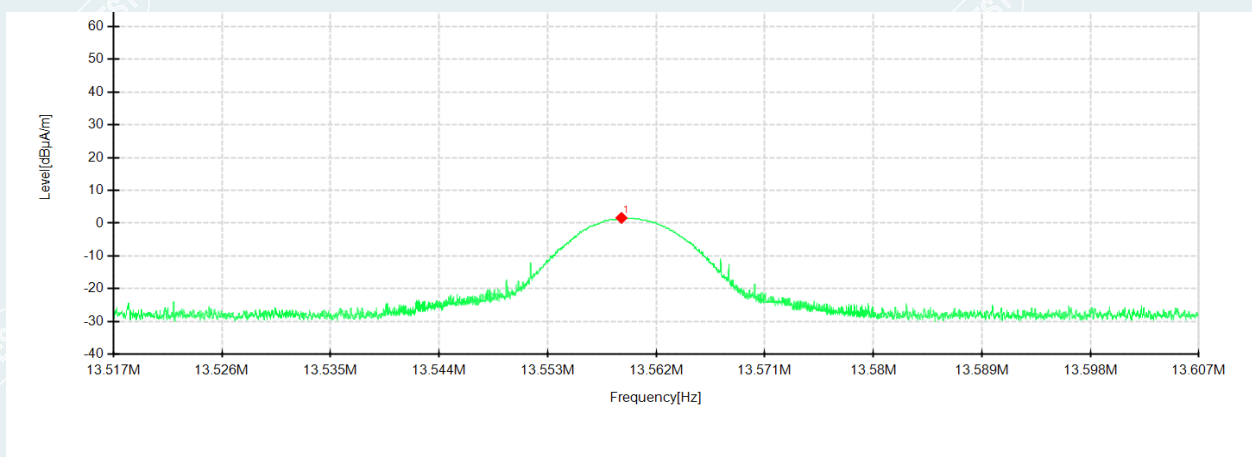
NO.	Freq. [MHz]	Level at 3m [dBμA/m]	Factor [dB]	Level at 10m [dBμA/m]	Margin [dB]	Limit at 10m [dBμA/m]	Height [cm]	Angle [°]	Polarity
1	13.5593	-3.33	-30.68	-26.43	79.67	53.24	100	192	Z

Note:

- H-field Level at 10m = H-field Level at 3m - 23.1 dB = -3.33 dBμA/m - 23.1 dB = -26.43 dBμA/m;
- Maximum EIRP: $P_{(10m)} = 30 * (4 * \pi * d * 10^{((H-120)/20)})^2 = 30 * (4 * 3.14 * 10 * 10^{((-26.43-120)/20)})^2 = 1.0767E-09 \text{ W} = 1.0767E-06 \text{ mW}$.

Project Information

Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0001
Mode:	Mode 2	Voltage:	AC 230V/50Hz
Environment:	25.0°C/60%RH/101.0kPa	Engineer:	Chen Xiacong
Test date:	2024-04-22	Remark:	X



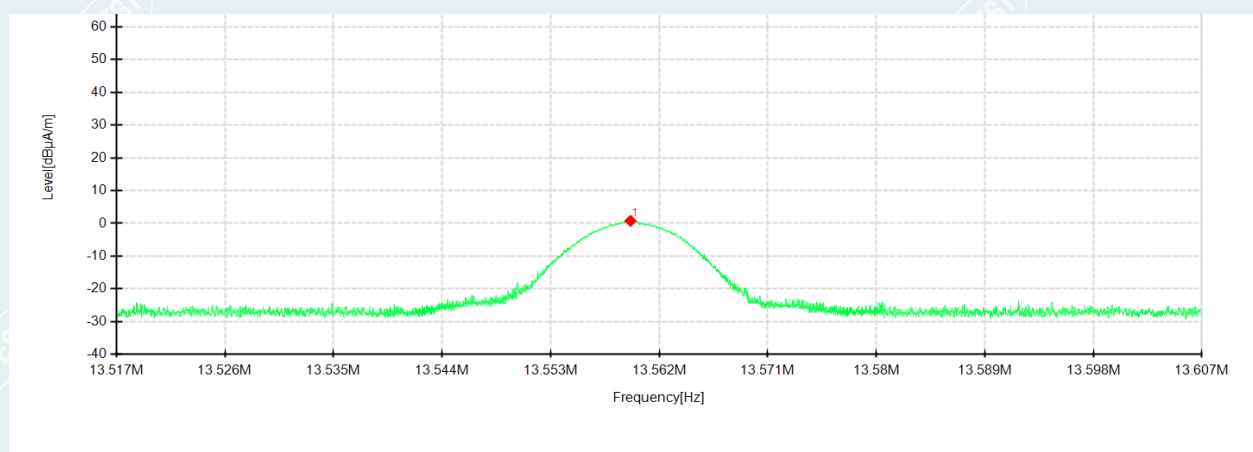
Suspected Data List

NO.	Freq. [MHz]	Level at 3m [dBμA/m]	Factor [dB]	Level at 10m [dBμA/m]	Margin [dB]	Limit at 10m [dBμA/m]	Height [cm]	Angle [°]	Polarity
1	13.5591	1.61	-30.68	-21.49	74.73	53.24	100	86	X

Note:

- H-field Level at 10m = H-field Level at 3m - 23.1 dB = 1.61 dBμA/m - 23.1 dB = -21.49 dBμA/m;
- Maximum EIRP: $P_{(10m)} = 30 \cdot (4 \cdot \pi \cdot d \cdot 10^{((H-120)/20)})^2 = 30 \cdot (4 \cdot 3.14 \cdot 10 \cdot 10^{((-21.49-120)/20)})^2 = 3.3582E-09 \text{ W} = 3.3582E-06 \text{ mW}$.

Project Information			
Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0001
Mode:	Mode 2	Voltage:	AC 230V/50Hz
Environment:	25.0°C/60%RH/101.0kPa	Engineer:	Chen Xiacong
Test date:	2024-04-22	Remark:	Y



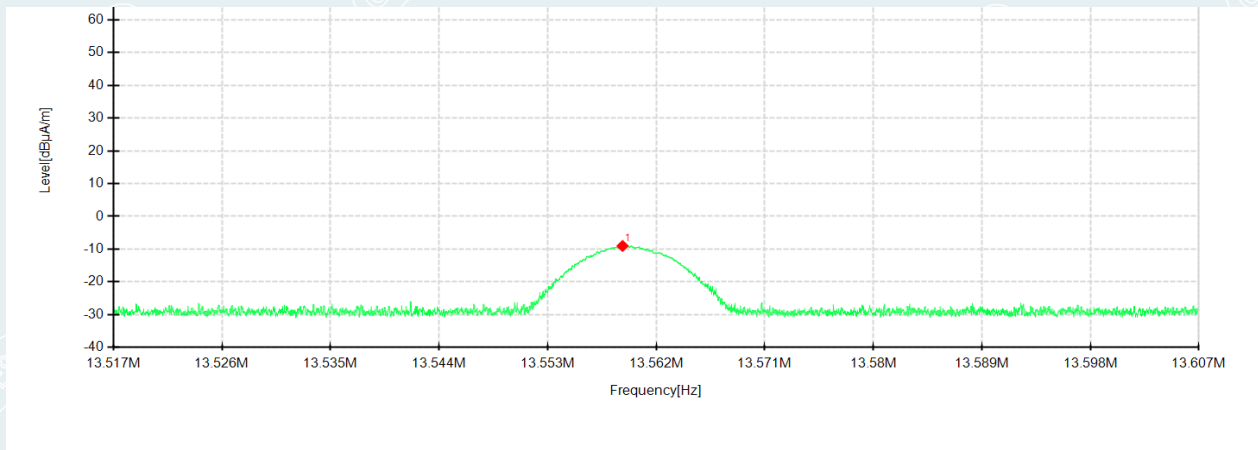
Suspected Data List									
NO.	Freq. [MHz]	Level at 3m [dBμA/m]	Factor [dB]	Level at 10m [dBμA/m]	Margin [dB]	Limit at 10m [dBμA/m]	Height [cm]	Angle [°]	Polarity
1	13.5596	0.76	-30.68	-22.34	75.58	53.24	100	45	Y

Note:

- H-field Level at 10m = H-field Level at 3m -23.1 dB = 0.76 dBμA/m – 23.1 dB = -22.34 dBμA/m.
- Maximum EIRP: $P_{(10m)} = 30 * (4 * \pi * d * 10^{((H-120)/20)})^2 = 30 * (4 * 3.14 * 10 * 10^{((-22.34 - 120)/20)})^2 = 2.7612E-09 \text{ W} = 2.7612E-06 \text{ mW}$.

Project Information

Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0001
Mode:	Mode 2	Voltage:	AC 230V/50Hz
Environment:	25.0°C/60%RH/101.0kPa	Engineer:	Chen Xiacong
Test date:	2024-04-22	Remark:	Z



Suspected Data List

NO.	Freq. [MHz]	Level at 3m [dBμA/m]	Factor [dB]	Level at 10m [dBμA/m]	Margin [dB]	Limit at 10m [dBμA/m]	Height [cm]	Angle [°]	Polarity
1	13.5592	-9.01	-30.68	-32.11	85.35	53.24	100	294	Z

Note:

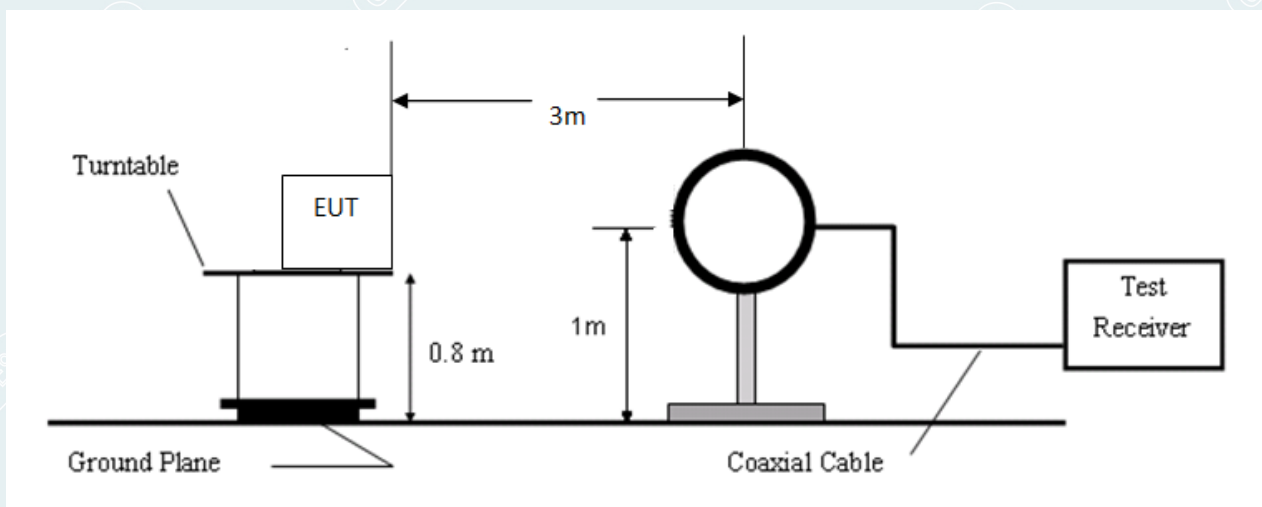
- Limit at 3m[dBμA/m]= 42+23.1=65.1 [dBμA/m];
- H-field Level at 10m = H-field Level at 3m -23.1 dB = -9.01 dBμA/m – 23.1 dB = -32.11 dBμA/m;
- Maximum EIRP: $P_{(10m)} = 30 \cdot (4 \cdot \pi \cdot d \cdot 10^{((H-120)/20)})^2 = 30 \cdot (4 \cdot 3.14 \cdot 10 \cdot 10^{((-32.11-120)/20)})^2 = 2.9114E-10 \text{ W} = 2.9114E-07 \text{ mW}$.

5.4 TRANSMITTER RADIATED SPURIOUS DOMAIN EMISSION LIMITS < 30 MHz

5.4.1 LIMIT

State	Frequency $9 \text{ kHz} \leq f < 10 \text{ MHz}$	Frequency $10 \text{ MHz} \leq f < 30 \text{ MHz}$
Operating	27 dB μ A/m at 9 kHz descending 3 dB/oct	-3,5 dB μ A/m
Standby	5,5 dB μ A/m at 9 kHz descending 3 dB/oct	-25 dB μ A/m

5.4.2 TEST SETUP



5.4.3 SPECTRUM ANALYZER SETTING

9kHz-150kHz

Spectrum Parameters	Setting
RBW	200Hz
VBW	200Hz
Start frequency	9kHz
Stop frequency	150kHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

150kHz-30MHz

Spectrum Parameters	Setting
RBW	9kHz
VBW	9kHz
Start frequency	150kHz
Stop frequency	30MHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

5.4.4 TEST PROCEDURE

For Operating Mode & Standby:

- EUT was placed on a turn table, which is 0.8 meter high above ground.
- Set the EUT transmit continuously with maximum output power.
- Loop Antenna is set 3 meters away from the EUT, which is connect to a measurement receiver.
- Spectrum analyzer setting parameters in accordance with section 5.4.3.
- The turn table can rotate 360 degrees to determine the position of the maximum emission level.
- Both horizontal and vertical polarization of the antenna are set on test.
- Record the results in the test report.

5.4.5 DATASAMPLE

Below 30MHz

Frequency [MHz]	Level [dBμA/m at 3m]	Factor [dB]	Conversion factor (dB)	Level [dBμA/m at 10m]	Limit [dBμA/m at 10m]	Margin [dB]	Height [cm]	Detector	Angle [°]	Polarity
xxx	-13.67	-32.05	31.3	17.67	27	9.33	100	QP	336	X

Frequency (MHz)

= Emission frequency in MHz

Level (dBuA/m at 3m)

= Reading (dBuA/m) + Factor (dB)

Level (dBuA/m at 10m)

= Level (dBuA/m at 3m) - Conversion factor (dB)

Conversion factor (dB)

= Annex H.2 of ETSI EN 300 330 V2.1.1

Margin (dB)

= Limit(dBuA/m) - Level (dBuA/m at 10m)

QP

= Quasi-peak Reading

5.4.6 TEST RESULT

Project Information			
Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0004
Mode:	Mode 1	Voltage:	AC 230V/50Hz
Environment:	25.0°C/60%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2024-04-22	Remark:	/

Suspected Data List										
NO.	Freq. [MHz]	Level [dBμA/m at 3m]	Factor [dB]	Conversion factor (dB)	Level [dBμA/m at 10m]	Limit [dBμA/m at 10m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.0241	2.28	-30.97	31.3	-29.02	22.81	51.83	100	348	X
2	0.0401	4.05	-31.00	31.3	-27.25	20.60	47.85	100	179	X
3	0.0561	3.12	-31.10	31.3	-28.18	19.14	47.32	100	179	X
4	0.1500	12.77	-31.59	31.3	-18.53	14.86	33.39	100	15	X
5	3.0641	-17.49	-31.55	30.0	-47.49	3.04	50.53	100	55	X
6	13.5601	3.57	-30.88	23.1	-19.53	4.80	24.33	100	170	X

Suspected Data List										
NO.	Freq. [MHz]	Level [dBμA/m at 3m]	Factor [dB]	Conversion factor (dB)	Level [dBμA/m at 10m]	Limit [dBμA/m at 10m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.0241	21.74	-30.97	31.3	-9.56	22.81	32.37	100	335	Y
2	0.0401	24.31	-31.00	31.3	-6.99	20.60	27.59	100	19	Y
3	0.0722	23.55	-31.37	31.3	-7.75	18.05	25.80	100	19	Y
4	0.7022	-2.67	-31.69	31.3	-33.97	8.15	42.12	100	155	Y
5	2.9858	-9.45	-31.56	30.0	-39.45	3.16	42.61	100	142	Y
6	13.5601	-0.99	-30.88	23.1	-24.09	4.80	28.89	100	129	Y

Suspected Data List										
NO.	Freq. [MHz]	Level [dBμA/m at 3m]	Factor [dB]	Conversion factor (dB)	Level [dBμA/m at 10m]	Limit [dBμA/m at 10m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.0402	11.00	-31.00	31.3	-20.30	20.59	40.89	100	215	Z
2	0.0562	11.78	-31.10	31.3	-19.52	19.14	38.66	100	215	Z
3	0.1202	6.62	-31.66	31.3	-24.68	15.83	40.51	100	215	Z
4	0.6948	-5.27	-31.70	31.3	-36.57	8.20	44.77	100	107	Z
5	3.2731	-21.59	-31.53	30.0	-51.59	2.76	54.35	100	134	Z
6	13.5601	-8.23	-30.88	23.1	-31.33	4.80	36.13	100	262	Z

Project Information			
Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0001
Mode:	Mode 2	Voltage:	AC 230V/50Hz
Environment:	25.0°C/60%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2024-04-22	Remark:	/

Suspected Data List										
NO.	Freq. [MHz]	Level [dBμA/m at 3m]	Factor [dB]	Conversion factor (dB)	Level [dBμA/m at 10m]	Limit [dBμA/m at 10m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.0161	-28.83	-30.93	31.3	-60.13	3.08	63.21	100	107	X
2	0.0282	-30.43	-30.99	31.3	-61.73	0.63	62.36	100	13	X
3	0.1530	-14.45	-31.58	31.3	-45.75	-6.72	39.03	100	226	X
4	0.4067	-16.60	-31.63	31.3	-47.90	-10.97	36.93	100	320	X
5	0.6992	-3.08	-31.69	31.3	-34.38	-13.33	21.05	100	293	X
6	13.5825	-15.40	-30.87	23.1	-38.50	-16.70	21.80	100	170	X

Suspected Data List										
NO.	Freq. [MHz]	Level [dBμA/m at 3m]	Factor [dB]	Conversion factor (dB)	Level [dBμA/m at 10m]	Limit [dBμA/m at 10m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.0161	-28.74	-30.93	31.3	-60.04	3.08	63.12	100	137	Y
2	0.0281	-26.16	-30.99	31.3	-57.46	0.65	58.11	100	2	Y
3	0.0560	-28.15	-31.10	31.3	-59.45	-2.35	57.10	100	340	Y
4	0.0881	-29.87	-31.58	31.3	-61.17	-4.32	56.85	100	68	Y
5	0.6963	-2.12	-31.69	31.3	-33.42	-13.31	20.11	100	279	Y
6	13.5586	-14.64	-30.87	23.1	-37.74	-16.70	21.04	100	75	Y

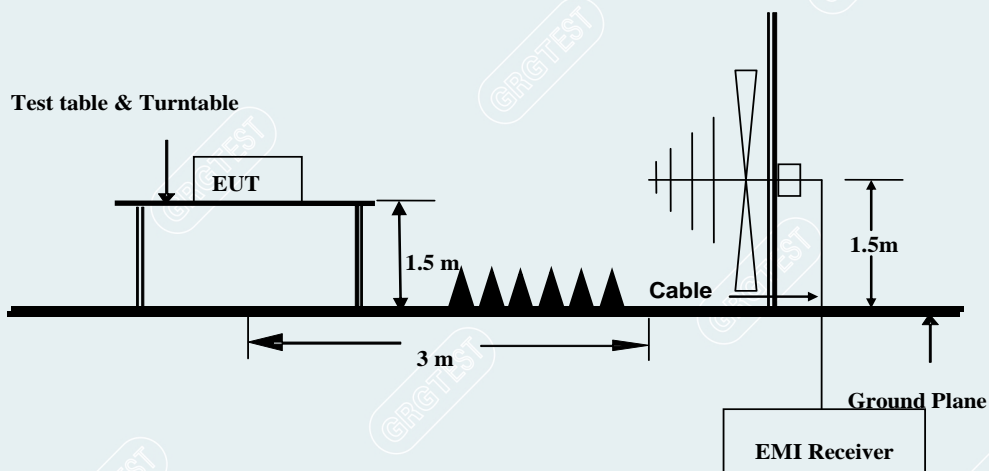
Suspected Data List										
NO.	Freq. [MHz]	Level [dBμA/m at 3m]	Factor [dB]	Conversion factor (dB)	Level [dBμA/m at 10m]	Limit [dBμA/m at 10m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	0.0241	-21.08	-31.00	31.3	-52.38	1.32	53.70	100	68	Z
2	0.0401	-18.29	-31.10	31.3	-49.59	-0.90	48.69	100	340	Z
3	0.0562	-18.73	-31.54	31.3	-50.03	-2.36	47.67	100	340	Z
4	0.1679	-12.38	-31.70	31.3	-43.68	-7.13	36.55	100	344	Z
5	0.6933	-2.66	-30.87	31.3	-33.96	-13.29	20.67	100	168	Z
6	13.5706	-22.19	-31.00	23.1	-45.29	-16.70	28.59	100	168	Z

5.5 TRANSMITTER RADIATED SPURIOUS DOMAIN EMISSION LIMITS > 30 MHz

5.5.1 LIMIT

State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies between 30 MHz to 1 000 MHz
Operating	4 nW	250 nW
Standby	2 nW	2 nW

5.5.2 TEST SETUP



5.5.3 SPECTRUM ANALYZER SETTING

Spectrum Parameters	Setting
RBW	100kHz
VBW	100kHz
Start frequency	30MHz
Stop frequency	1000MHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

5.5.4 TEST PROCEDURE

For operating mode& standby mode:

- EUT was placed on a turn table, which is 1.5 meter high above ground.
- Set the EUT in normal use with support mode of operation.
- Test Antenna is set 3 meters away from the EUT, which is connect to a measurement receiver.
- Spectrum analyzer setting parameters in accordance with section 5.5.3.
- The turn table can rotate 360 degrees to determine the position of the maximum emission level.
- Both horizontal and vertical polarization of the antenna are set on test.
- Record the results in the test report.

5.5.5 DATA SAMPLE

Below 1GHz

Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB/m]	Detector
xxx	xxx	xxx	xxx	xxx	xxx	QP

Frequency (MHz)

= Emission frequency in MHz

Reading (dBm)

= Uncorrected Analyzer / Receiver reading

Correct Factor (dB/m)

= Antenna factor + Cable loss – Amplifier gain

Result (dBm)

= Reading (dBm) + Corr. Factor (dB/m)

Limit (dBm)

= Limit stated in standard

Margin (dB)

= Result (dBm) – Limit(dBm)

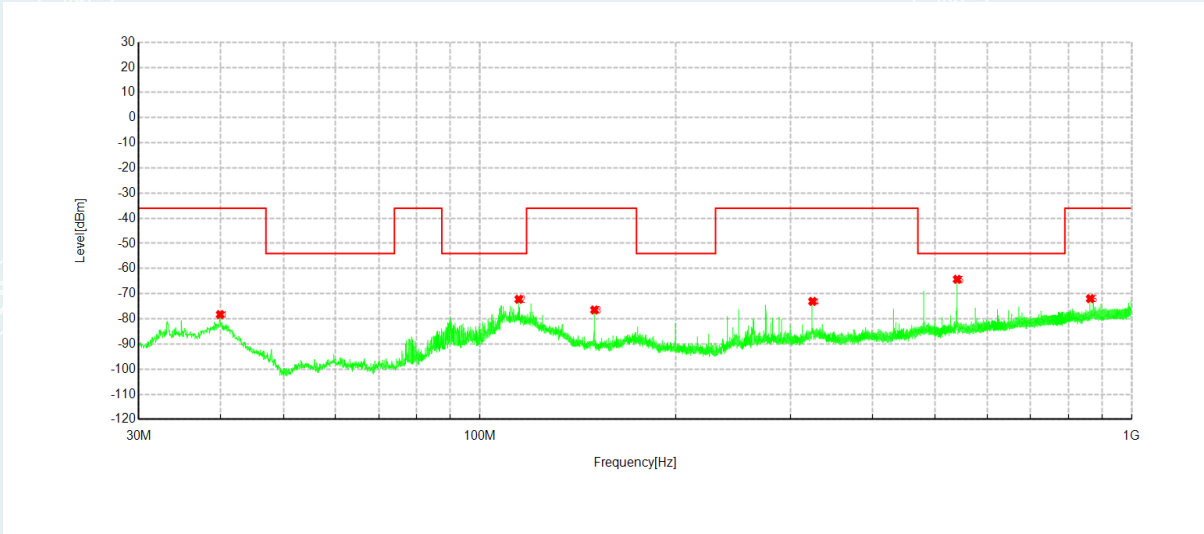
RMS

= Root Mean Square

----- The following blanks -----

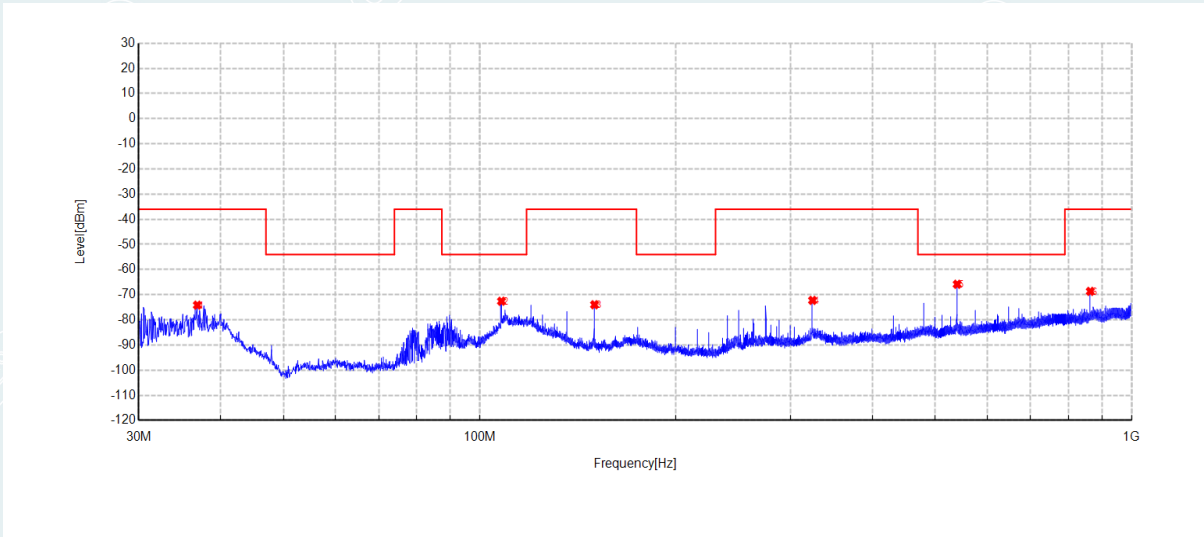
5.5.6 TEST RESULT

Project Information			
Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0004
Mode:	Mode 1	Voltage:	AC 230V/50Hz
Environment:	23.5°C/52%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2024-04-23	Remark:	/



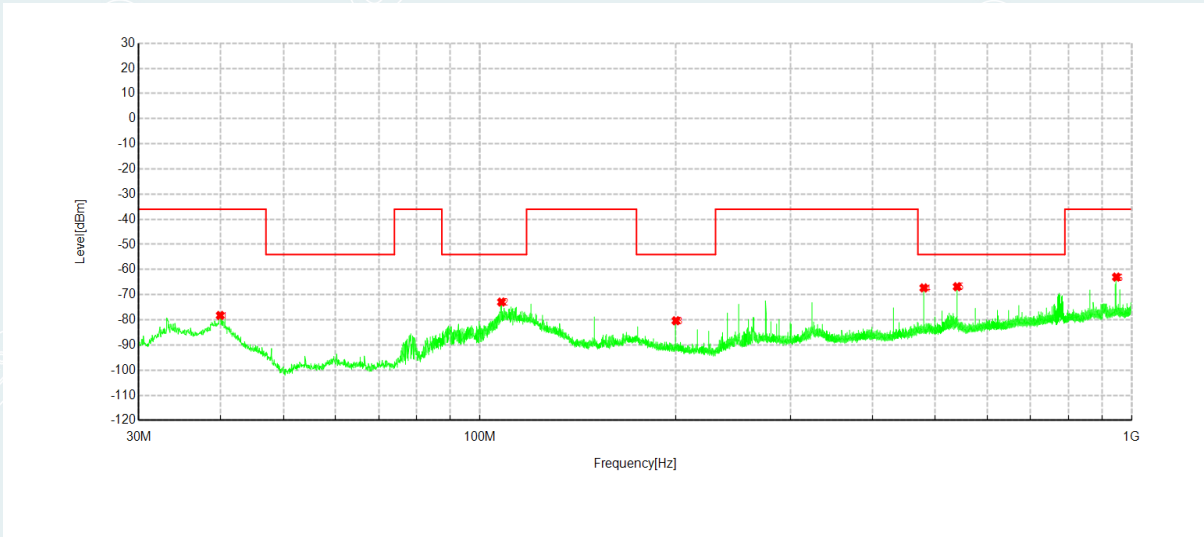
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	39.991	-67.29	-78.30	-36.00	42.30	-11.01	QP	Horizontal
2	114.8265	-63.18	-72.23	-54.00	18.23	-9.05	QP	Horizontal
3	149.989	-57.83	-76.48	-36.00	40.48	-18.65	QP	Horizontal
4	324.007	-57.10	-73.07	-36.00	37.07	-15.97	QP	Horizontal
5	540.026	-52.60	-64.28	-54.00	10.28	-11.68	QP	Horizontal
6	864.103	-64.12	-71.97	-36.00	35.97	-7.85	QP	Horizontal

Project Information			
Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0004
Mode:	Mode 1	Voltage:	AC 230V/50Hz
Environment:	23.5℃/52%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2024-04-23	Remark:	/



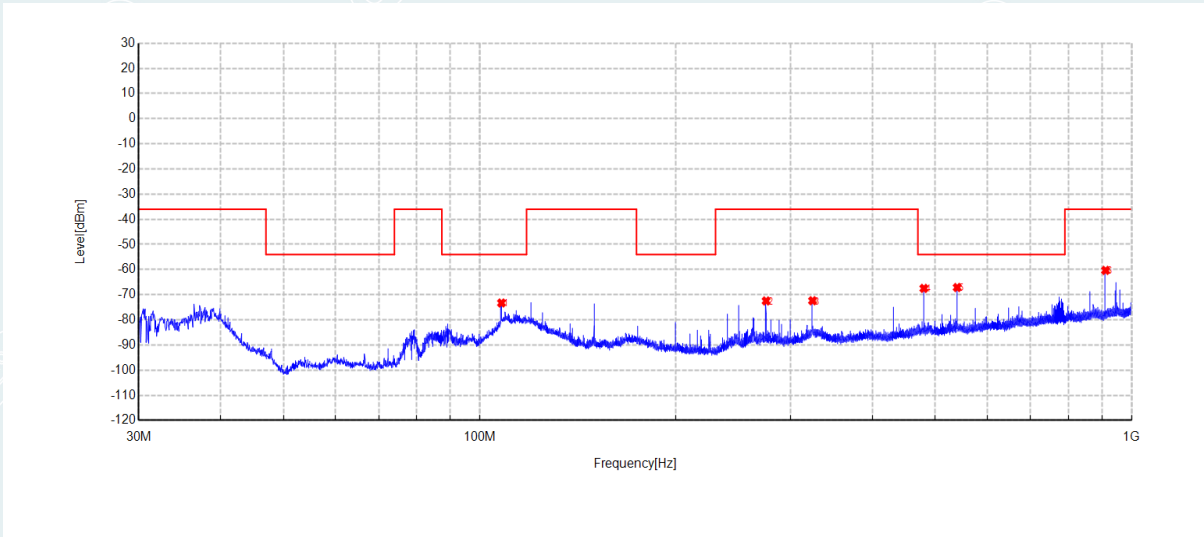
Suspected Data List								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	36.887	-60.71	-74.15	-36.00	38.15	-13.44	QP	Vertical
2	107.988	-62.60	-72.60	-54.00	18.60	-10.00	QP	Vertical
3	149.989	-55.34	-73.99	-36.00	37.99	-18.65	QP	Vertical
4	324.007	-56.30	-72.27	-36.00	36.27	-15.97	QP	Vertical
5	540.026	-54.18	-65.86	-54.00	11.86	-11.68	QP	Vertical
6	864.0545	-60.83	-68.68	-36.00	32.68	-7.85	QP	Vertical

Project Information			
Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0001
Mode:	Mode 2	Voltage:	AC 230V/50Hz
Environment:	23.5℃/52%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2024-04-23	Remark:	/



Suspected Data List								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	39.991	-67.24	-78.25	-36.00	42.25	-11.01	QP	Horizontal
2	107.988	-62.93	-72.93	-54.00	18.93	-10.00	QP	Horizontal
3	199.9925	-60.21	-80.36	-54.00	26.36	-20.15	QP	Horizontal
4	479.983	-53.67	-67.31	-54.00	13.31	-13.64	QP	Horizontal
5	540.026	-55.15	-66.83	-54.00	12.83	-11.68	QP	Horizontal
6	947.5715	-56.13	-63.00	-36.00	27.00	-6.87	QP	Horizontal

Project Information			
Project No	E20240410840201	EUT:	Smart Lock U50
Model:	DL-D05D	SN:	E20240410840201-0001
Mode:	Mode 2	Voltage:	AC 230V/50Hz
Environment:	23.5℃/52%RH/101.0kPa	Engineer:	Zhang Zishan
Test date:	2024-04-23	Remark:	/



Suspected Data List								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	107.988	-63.30	-73.30	-54.00	19.30	-10.00	QP	Vertical
2	274.9735	-53.89	-72.49	-36.00	36.49	-18.60	QP	Vertical
3	324.007	-56.43	-72.40	-36.00	36.40	-15.97	QP	Vertical
4	480.08	-53.86	-67.50	-54.00	13.50	-13.64	QP	Vertical
5	540.026	-55.46	-67.14	-54.00	13.14	-11.68	QP	Vertical
6	912.0695	-52.35	-60.33	-36.00	24.33	-7.98	QP	Vertical

APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM

Please refer to the attached document E20240410840201-6-Test Photo.

APPENDIX B. PHOTOGRAPHS OF EUT

Please refer to the attached document E20240410840201-7-EUT Photo.

----- End of Report -----